

WE CLAIM:

1. A method of displaying a progressive refresh bitstream, the progressive refresh bitstream comprising a plurality of P-pictures, the method comprising the steps of:

5 decoding a first P-picture containing a first section, the first section comprising one or more I-slices;

 zeroing out pixels of the first P-picture, except for the pixels that correspond to the first section, prior to displaying the first P-picture; and

10 displaying the first P-picture.

2. The method of displaying the progressive refresh bitstream according to claim 1, wherein the first section is located at the top of the first P-picture.

3. The method of displaying the progressive refresh bitstream according to claim 2, wherein the step of zeroing out pixels of the first P-picture comprises the step of zeroing out all pixels below the first section at the top.

4. The method of displaying the progressive refresh bitstream according to claim 1, wherein the first section is located at the bottom of the first P-picture.

5. The method of displaying the progressive refresh bitstream according to claim 4, wherein the step of zeroing out pixels of the first P-picture comprises the step of zeroing out all pixels above the first section at the bottom.

30 6. The method of displaying a progressive refresh bitstream according to claim 1, wherein the first P-picture is an entry picture.

7. The method of displaying a progressive refresh bitstream according to claim 6, wherein the P-pictures that are decoded before the entry picture are not displayed.

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8. The method of displaying a progressive refresh bitstream according to claim 1, the method further comprising the steps of:

10 decoding a second P-picture containing a second section, the second section comprising one or more I-slices;

15 zeroing out pixels of the second P-picture, except for the pixels that correspond to the second section and the pixels that correspond to slices at the same relative location in the second P-picture as the first section in the first P-picture, prior to displaying the second P-picture; and

20 displaying the second P-picture, wherein the slices that are at the same relative location in the second P-picture as the first section in the first P-picture are decoded based on the I-slices of the first section.

25 9. The method of displaying a progressive refresh bitstream according to claim 8, wherein the first section is located at the top of the first P-picture, and the second section is located below and adjacent to the slices that are at the same relative location in the second P-picture as the first section in the first P-picture.

30 10. The method of displaying a progressive refresh bitstream according to claim 9, wherein the step of zeroing out pixels of the second P-picture comprises the step of zeroing out all pixels below the second section.

11. The method of displaying a progressive refresh bitstream according to claim 10, the method further comprising the steps of:

5 decoding a third P-picture containing one or more I-slices below slices that are at the same relative position in the third P-picture as the first and second sections, respectively, in the first and second P-pictures;

 zeroing out all pixels below the I-slices of the third
10 P-picture prior to displaying the third P-picture; and

 displaying the third P-picture,

 wherein the slices above the I-slices of the third P-picture are decoded based on the I-slices of previously decoded P-pictures.

15 12. The method of displaying a progressive refresh bitstream according to claim 1, the method further comprising the step of:

 determining a refresh depth of the progressive refresh
20 bitstream,

 wherein each P-picture of the progressive refresh bitstream includes a number of contiguous I-slices, which number is equal to the refresh depth.

25 13. The method of displaying a progressive refresh bitstream according to claim 12, wherein the contiguous I-slices are refreshed I-slices.

 14. The method of displaying a progressive refresh
30 bitstream according to claim 1, wherein the progressive refresh bitstream includes a HITS bitstream.

15. The method of displaying a progressive refresh bitstream according to claim 1, wherein the progressive refresh bitstream further comprises a plurality of B-pictures, wherein the B-pictures are not displayed until at least one P-picture is completely decoded.

16. The method of displaying a progressive refresh bitstream according to claim 15, wherein the B-pictures are not decoded until at least one P-picture is completely decoded.

17. The method of displaying a progressive refresh bitstream according to claim 1, wherein one or more of the P-pictures are ahead of the first P-picture in display order after channel acquisition, wherein the P-pictures ahead of the first P-picture in display order are not displayed.

18. The method of displaying a progressive refresh bitstream according to claim 12, wherein position of the contiguous I-slices move from the top at the first P-picture towards the bottom with each subsequent P-picture in display order until a last slice of one of the P-pictures is one of the contiguous I-slices, wherein each P-picture, starting with the first P-picture, is displayed with the pixels below the contiguous I-slices zeroed out.

19. The method of displaying a progressive refresh bitstream according to claim 18, wherein search range for motion vectors for each P-picture is limited to a section of the P-picture that corresponds to sections of previous P-pictures that contain contiguous I-slices.

20. The method of displaying a progressive refresh bitstream according to claim 18, wherein the P-picture with one of the contiguous I-slices as the last slice is the first one of the P-pictures to be completely decoded.

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21. The method of displaying a progressive refresh bitstream according to claim 20, wherein all pixels of subsequent P-pictures are decoded and displayed after at least one P-picture has been completed decoded.

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22. An apparatus for decoding and displaying a progressive refresh bitstream, the progressive refresh bitstream comprising a plurality of P-pictures, the apparatus comprising:

a decoder for decoding the P-pictures;

means for zeroing out pixels of the P-pictures; and

a display for displaying the P-pictures,

wherein the decoder decodes a first P-picture containing a first section, the first section comprising one or more I-slices,

wherein the zeroing out means zeroes out pixels of the first P-picture, except for the pixels that correspond to the first section, and

wherein the display displays the first P-picture with the pixels, except for the pixels that correspond to the first section, zeroed out.

23. The apparatus for decoding and displaying a progressive refresh bitstream according to claim 22, wherein the first section is located at the top of the first P-picture.

24. The apparatus for decoding and displaying a progressive refresh bitstream according to claim 23, wherein the

zeroing out means zeroes out all pixels below the first section at the top.

25. The apparatus for decoding and displaying a
5 progressive refresh bitstream according to claim 22, wherein the decoder is an MPEG-2 decoder.

26. The apparatus for decoding and displaying a
progressive refresh bitstream according to claim 22,

10 wherein the decoder decodes a second P-picture containing a second section, the second section comprising one or more I-slices,

15 wherein the slices that are at the same relative location in the second P-picture as the first section in the first P-picture are decoded based on the I-slices of the first section.

20 wherein the zeroing out means zeroes out pixels of the second P-picture, except for the pixels that correspond to the second section and the pixels that correspond to slices at the same relative location in the second P-picture as the first section in the first P-picture, prior to displaying the second P-picture, and

wherein the display displays the second P-picture.

25 27. The apparatus for decoding and displaying a progressive refresh bitstream according to claim 26, wherein the first section is located at the top of the first P-picture, and the second section is located below and adjacent to the slices that are at the same relative location in the second P-picture
30 as the first section in the first P-picture.

28. The apparatus for decoding and displaying a progressive refresh bitstream according to claim 27, wherein zeroing out means zeroes out all pixels below the second section.

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29. The apparatus for decoding and displaying a progressive refresh bitstream according to claim 28,

wherein the decoder decodes a third P-picture containing one or more I-slices below slices that are at the same relative position in the third P-picture as the first and second sections, respectively, in the first and second P-pictures,

wherein the zeroing out means zeroes out all pixels below the I-slices of the third P-picture prior to displaying the third P-picture,

wherein the display displays the third P-picture with all pixels below the I-slices zeroed out, and

wherein the slices above the I-slices of the third P-picture are decoded based on the I-slices of previously decoded P-pictures.

30. A system for encoding and decoding a progressive refresh bitstream, the system comprising:

an encoder for encoding video into the progressive refresh bitstream, the progressive refresh bitstream comprising a plurality of P-pictures;

a decoder for decoding the P-pictures;

a transmission medium for carrying the progressive refresh bitstream from the encoder to the decoder;

means for zeroing out pixels of the P-pictures; and

a display for displaying the P-pictures,

wherein the decoder decodes a first P-picture containing a first section, the first section comprising one or more I-slices,

5 wherein the zeroing out means zeroes out pixels of the first P-picture, except for the pixels that correspond to the first section, and

wherein the display displays the first P-picture with the pixels, except for the pixels that correspond to the first section, zeroed out.

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31. The system for encoding and decoding a progressive refresh bitstream according to claim 30, wherein the encoder is an MPEG-2 encoder and the decoder is an MPEG-2 decoder.

15 32. The system for encoding and decoding a progressive refresh bitstream according to claim 30,

wherein the decoder decodes a second P-picture containing a second section, the second section comprising one or more I-slices,

20 wherein the slices that are at the same relative location in the second P-picture as the first section in the first P-picture are decoded based on the I-slices of the first section.

25 wherein the zeroing out means zeroes out pixels of the second P-picture, except for the pixels that correspond to the second section and the pixels that correspond to slices at the same relative location in the second P-picture as the first section in the first P-picture, prior to displaying the second P-picture, and

30 wherein the display displays the second P-picture.

33. The system for encoding and decoding a progressive refresh bitstream according to claim 32, wherein the first section is located at the top of the first P-picture, and the second section is located below and adjacent to the slices that are at the same relative location in the second P-picture as the first section in the first P-picture.

34. The system for encoding and decoding a progressive refresh bitstream according to claim 33, wherein zeroing out means zeroes out all pixels below the second section.

35. The system for encoding and decoding a progressive refresh bitstream according to claim 34,

wherein the decoder decodes a third P-picture containing one or more I-slices below slices that are at the same relative position in the third P-picture as the first and second sections, respectively, in the first and second P-pictures,

wherein the zeroing out means zeroes out all pixels below the I-slices of the third P-picture prior to displaying the third P-picture,

wherein the display displays the third P-picture with all pixels below the I-slices zeroed out, and

wherein the slices above the I-slices of the third P-picture are decoded based on the I-slices of previously decoded P-pictures.